

**Hermit crabs of the genus *Paguristes* (Crustacea: Decapoda:  
Diogenidae) from the western Atlantic**  
**Part III. *Paguristes markhami*, a new species from the  
Bahama and Caicos Islands**

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*Abstract.*—After a 20 year hiatus, a review of the western Atlantic hermit crabs of the genus *Paguristes* is reinitiated. This review resumes with the description of a new species based on specimens collected in the Bahamas and Turk and Caicos Islands. *Paguristes markhami*, new species, is described, illustrated, and compared with other known species of the genus from the western Atlantic.

The genus *Paguristes* Dana, 1851, is one of the most speciose of all hermit crab genera, and certainly is the genus having the most representatives in the western Atlantic. Alcock (1905) listed 51 species worldwide, and by the time of Gordan's (1956) bibliographic survey, 85 species and/or subspecies had been recognized. The number of western Atlantic species has never adequately been appraised. Provenzano (1959, 1961) and Holthuis (1959) provided the first critical reviews of several western Atlantic species of the genus. Subsequently, McLaughlin & Provenzano (1974) reported on seven species of the *Paguristes tortugae* Schmitt, 1933 complex, four of which were described as new species. That paper was to have been the first part of a continuing series of reports on regional *Paguristes* species. At that time, the authors acknowledged the existence of at least three additional species complexes. In the second part of the series, McLaughlin & Provenzano (1975) described an additional six new species of *Paguristes*, but none of these were associated with the three previously recognized complexes. Several circumstances apparently precluded the continuation of the

series, although information on the genus continued to be accumulated by the authors. Since the publications of McLaughlin & Provenzano (1974, 1975), faunistic reports have summarized the known species (e.g., Williams 1984, Abele & Kim, 1986); however, only three new species have since been added to the fauna of the western Atlantic (Martínez-Iglesias & Gómez 1989, Campos & Sanchez 1995).

Recently I was afforded the opportunity to continue the study of regional *Paguristes* species through the auspices of the Florida Department of Natural Resources, St. Petersburg; the Smithsonian Institution, Washington, D.C.; the Rosenstiel School of Marine and Atmospheric Sciences, University of Miami; and the personal collections of Dr. P. A. McLaughlin. The present description of a new species represents the third part of this multi-part series. This distinctive, albeit small species was collected from coral and sponge habitats by Dr. John C. Markham, while SCUBA diving in various Caribbean localities in the Bahamas, and the Turk and Caicos Islands.

The holotype and one paratype have been deposited in the collections of the National

Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), and two paratypes in the Swedish Museum of Natural History, Stockholm (SMNH). One measurement, shield length (SL), as measured from the tip of the rostrum to the midpoint of the posterior margin of the shield, provides an indication of specimen size. Scanning electron micrographs (SEM) of the chelae of one of the paratypes of *Paguristes markhami*, new species, were taken with a Phillips 515 scanning electron microscope.

*Paguristes markhami* new species

Figs. 1, 2

*Holotype*.—Female (SL = 2.39 mm), 13.9 km off Saddleback Cay, Andros Island, Bahamas, 24°53.0'N, 77°52.5'W, 17.5 m, 10 Sep 1973, coll. J. C. Markham, USNM 275983.

*Paratypes*.—2 females (1 ovigerous) (SL = 2.00, 2.42 mm), Providenciales, Turks & Caicos Islands, 21°50.5'N, 72°20.8'W, 15–20 m, 31 Aug -1 Sep 1973, coll. J. C. Markham, SMNH 4724.—1 female (SL = 1.67 mm), west side of Crooked Island, Bahamas, 22°49.2'N, 74°21.1'W, 17.5 m, 26 Aug 1973, coll. J. C. Markham, USNM 275984.

*Description*.—Shield (Fig. 1A) considerably longer than broad; subtriangular, anterolateral margins sloping; anterior margin between rostrum and lateral projections straight or slightly concave; posterior margin roundly truncate. Dorsal surface of shield somewhat rugose anteriorly, and with several small spines or blunt or spinulose protuberances near each lateral margin. Rostrum moderately long, distally depressed, considerably exceeding lateral projections, triangular, terminating acutely, and with small spinule or spine. Lateral projections obtusely triangular, with marginal or submarginal spine. Branchiostegites each with small spine or spinule on anterior margin, and few tufts of setae.

Ocular peduncles overreaching antennal peduncles by about  $\frac{1}{2}$  own length, broad ba-

sally and tapering to base of cornea, with few plumose setae dorsomesially in proximal half; cornea slightly dilated. Ocular acicles slender; terminating in bifid or multifid spine; separated basally by  $\frac{3}{4}$  to entire basal width of 1 acicle.

Antennular peduncles moderately short, slightly shorter to slightly longer than ocular peduncles (distal margin of corneae). Ultimate segment unarmed. Penultimate segment with small spine on midventral margin. Basal segment with strong spine at ventrodorsal margin, and smaller spine on lateral face dorsally.

Antennal peduncles short, often not reaching beyond proximal half of ocular peduncles, with supernumerary segmentation. Fifth segment with few short setae. Fourth segment with small spine at dorsodistal margin. Third segment produced mesioventrally and terminating in strong, acute spine. Second segment with dorsolateral distal angle produced, terminating in strong, simple or bifid spine, lateral margin with 2 or 3 smaller spines and few long setae, mesial margin unarmed; dorsomesial distal angle with a small spine. First segment with small spine on distolateral margin; ventrodorsal margin produced, unarmed, but nearly obscured by long setae. Antennal acicle moderately long, usually reaching beyond proximal half of ultimate peduncular segment, terminating in strong spine; lateral margin with 3 or 4 spines and long, plumose setae; mesial margin usually with 1 or 2 spines and tufts of long, plumose setae. Antennal flagella short, not overreaching chelipeds; each article with numerous, short to moderately long setae, 1–3 articles in length.

Basis of third maxilliped with 1 or 2 small spines on inner margin; crista dentata of ischium composed of 13–15 regularly spaced small teeth, ventrodorsal margin with prominent spine; merus with 2 to 4 strong spines on ventral margin, dorsodorsal margin with small spine; carpus with small spine at dorsodorsal margin.

Chelipeds (Figs. 1B, 2) approximately

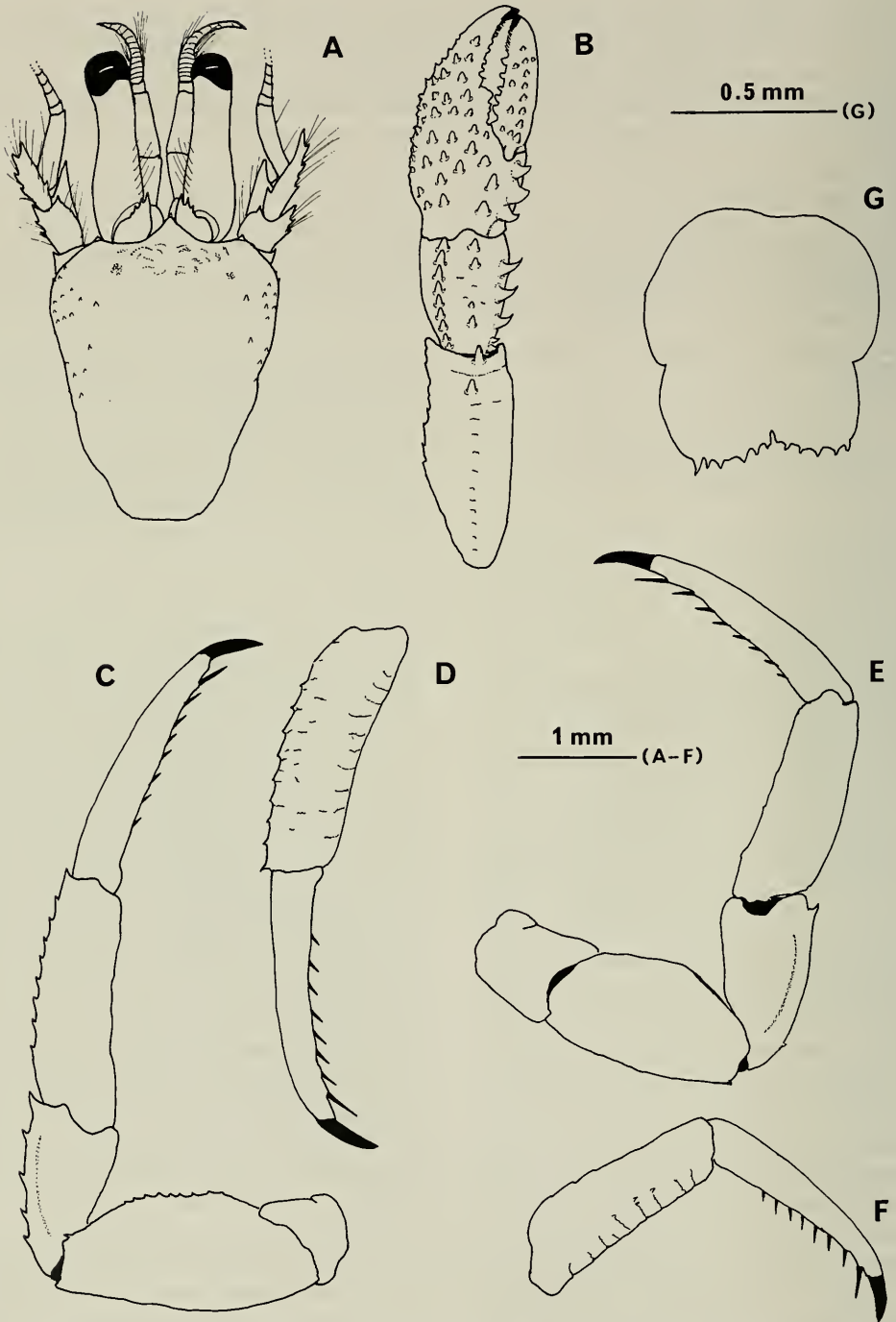


Fig. 1. *Paguristes markhami*, new species. Holotype, USNM 275983: A, shield and cephalic appendages; B, left cheliped; C, right second pereopod (lateral view); D, dactyl and propodus of right second pereopod (mesial view); E, left third pereopod (lateral view); F, dactyl and propodus of left third pereopod (mesial view); G, telson.

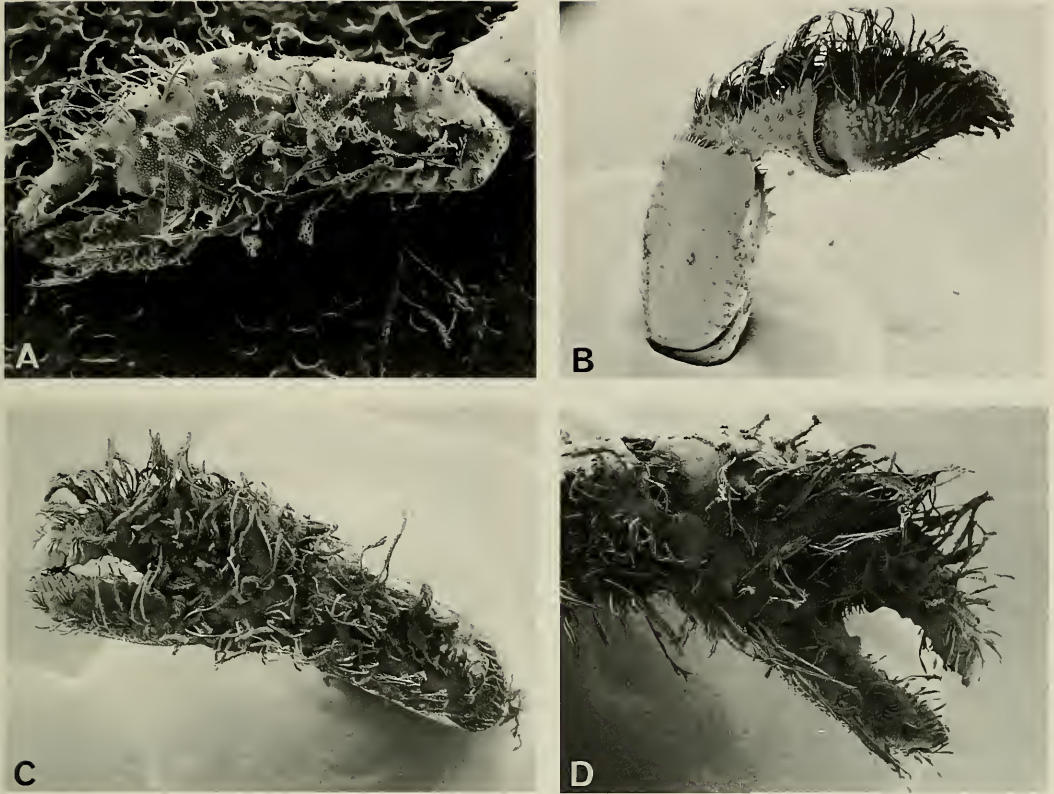


Fig. 2. *Paguristes markhami*, new species. Paratype, female (SL = 2.00 mm), Caicos Island: A, right cheliped, 31 $\times$ ; B, right cheliped (lateral view) 17.5 $\times$ ; C, chela and carpus of right cheliped, 142 $\times$ ; D, chela and carpus of left cheliped, 79 $\times$ .

equal; moderately short and stout. Dactyl nearly twice as long as palm; cutting edge with few calcareous teeth proximally, corneous teeth distally; terminating in large, broad corneous claw; dorsal surface with few small spines or spinules; dorsomesial margin with row of small spines and tufts of long setae. Palm about  $\frac{2}{3}$  as long as carpus; dorsal surface with numerous, but randomly placed spines extending onto lateral face and partially obscured by tufts of long plumose setae, dorsomesial margin with 3 strong corneous-tipped spines; dorsolateral margin not clearly delineated, ventral surfaces with few, small spines or spinulose tubercles and tufts of setae; mesial face faintly pitted, but glabrous. Carpus considerably shorter than merus; dorsal surface with incomplete longitudinal row of small

spines in midline; dorsomesial margin with row of strong spines, mesial face unarmed but with transverse rows of long, plumose setae distally; dorsolateral margin with row of moderately small spines, partially obscured by long, plumose setae, lateral face unarmed, ventrolateral distal angle strongly produced, terminating in prominent spine. Merus subtriangular; dorsal margin with row of low protuberances and tufts of long, plumose setae, 2 or 3 spines in distal third; mesial face unarmed, ventromesial margin with row of strong spines and tufts of long setae; lateral face unarmed, ventrolateral margin with row of small spines. Ischium with row of small spinules and tufts of short setae on ventromesial margin. Coxae with long setae on central surface and margins.

Second and third pereopods (Fig. 1C–F)

moderately long, overreaching outstretched chelipeds. Dactyls equalling or slightly exceeding length of propodi; in lateral view, almost straight to slightly ventrally curved; in dorsal view, straight; terminating in strong curved corneous claws; dorsal margins with tufts of dense plumose setae; lateral faces with scattered short setae; mesial faces with tufts of long plumose setae; ventral margin with row of 8 to 11 corneous spines and tufts of plumose setae. Propodi 1  $\frac{2}{3}$  to twice as long as carpi; dorsal margins each with row of spines and tufts of long plumose setae (second) or only tufts of long plumose setae (third); mesial faces with short transverse rows of long setae, setal rows of third occasionally accompanied by small spinules; lateral faces unarmed but with transverse rows of short setae; ventral margins with scattered setae. Carpi approximately  $\frac{3}{4}$  as long as meri; dorsal surfaces each with row of widely-spaced, small spines with tufts of plumose setae (second) or single dorsodistal spine and rarely 1 or 2 very small spines proximally (third), both with long plumose setae; lateral faces each with longitudinal sulcus lined with tufts of plumose setae. Meri laterally compressed; dorsal margin unarmed (second) or with very small spine at distal margin and occasionally 1 or 2 spinules in proximal half (third), mesial faces unarmed, lateral faces of second with spinule on ventrodiscal margin, third unarmed; ventral margins with row of small spines or spinules and tufts of long, plumose setae (second), or with small spine at distal angle and otherwise unarmed or with few small spinules and tufts of long plumose setae. Ischia each with small spine at ventrodiscal angle, ventral and dorsal margins with row of long plumose setae. Fourth pereopods each with small spine at dorsodistal margin of carpus.

Males unknown. Female with paired first pereopods modified as gonopods; basal segment usually glabrous; distal segment with long setae. Pleopods 2–4 with both rami well developed; pleopod 5 with exopod moderately well developed, endopod ves-

tigial. Brood pouch small, subquadrate, margins with long, plumose setae.

Telson (Fig. 1G) with posterior lobes slightly asymmetrical, left larger than right, terminal margins straight, separated by shallow median cleft; right and left terminal margins each with 4 to 6 small spines. Anterior lobes unarmed.

*Coloration*.—In preservative: uniformly opaque.

*Habitat*.—All four specimens were collected from either coral heads or rubble, or sponges.

*Distribution*.—Known only from localities in the Bahamas and Turk and Caicos Islands; 15–20 m.

*Etymology*.—The species is named for its collector, Dr. John C. Markham.

*Remarks*.—Because of its dense setation, *Paguristes markhami* might initially be grouped with species of McLaughlin & Provenzano's (1974) *P. tortugae* complex. As in species of the complex, *P. markhami* has a striking dense fringe of plumose setae bordering the ambulatory legs; however, in contrast to the *P. tortugae* complex species, the long plumose setae of the chelae of *P. markhami* do not occur as a marginal fringe, but instead in tufts scattered over the entire surfaces (Fig. 2A–D).

Two of the recently described species, *Paguristes mclaughlinae* Martínez-Iglesias & Gómez, 1989, and *P. werdingi* Campos & Sánchez, 1995, bear greater similarities in setation with *P. markhami*. The chelipeds of all three species appear to be similarly armed with scattered spines on the dorsal surfaces of the carpi. However, *P. mclaughlinae* is described and illustrated as having spines ventrolaterally on the propodi of the second and third pereopods, and spines on the dorsal surfaces of the carpi of the third pereopods. *Paguristes werdingi*, while apparently lacking ventral spines or spinules on the propodi of the third pereopods, is described as having a row of spines on the carpi of these appendages. In *P. markhami*, the ventrolateral surfaces of the propodi may have a series of short trans-

verse rows of setae on the second pereopods and simply scattered setae on the third; the carpi of the third pereopods have a dorsodistal spine and rarely one or two spinules. There is also a marked difference in shape and armature between the telson of *P. markhami* and the other two species.

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#### Literature Cited

- Abele, L. G., & W. Kim. 1986. An illustrated guide to the marine decapod crustaceans of Florida, Part 2.—Florida Department of Environmental Regulation, Technical Series 8(1):327–392.
- Alcock, A. 1905. Anomura. Fasc. I. *Pagurides*.—Catalogue of the Indian decapod Crustacea in the collections of the Indian Museum 2:1–297. Indian Museum, Calcutta.
- Campos, N. H., & H. Sánchez. 1995. Los cangrejos ermitaños del género *Paguristes* Dana (Anomura: Diogenidae) de la costa Norte Colombiana, con la descripción de dos nuevas especies.—Caldasia 17(82–85):569–586.
- Dana, J. D. 1851. *Conspectus crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wilkes e classe reipublicae foederatae duce, lexit et descripsit.*—(Preprint from) Proceedings of the Academy of Natural Sciences of Philadelphia 5:267–272.
- Gordan, J. 1956. A bibliography of pagurid crabs, exclusive of Alcock, 1905.—Bulletin of the American Museum of Natural History 108:253–352.
- Holthuis, L. B. 1959. The Crustacea Decapoda of Suriname (Dutch Guiana).—Zoologische Verhandelingen 44:1–296.
- Martínez-Iglesias, J. C., & O. Gómez. 1989. Una especie nueva del género *Paguristes* (Crustacea: Decapoda: Diogenidae) en las aguas de Cuba.—Poeyana 379:1–30.
- McLaughlin, P. A., & A. J. Provenzano, Jr. 1974. Hermit crabs of the genus *Paguristes* (Crustacea: Decapoda: Diogenidae) from the western Atlantic. Part I. The *Paguristes tortugae* complex, with notes on variation.—Bulletin of Marine Science 24:165–234.
- , & ———. 1975. Hermit crabs of the genus *Paguristes* (Crustacea: Decapoda: Diogenidae) from the western Atlantic. Part II. Descriptions of six new species.—Bulletin of Marine Science 24:885–938.
- Provenzano, A. J., Jr. 1959. The shallow-water hermit crabs of Florida.—Bulletin of Marine Science of the Gulf and Caribbean 9:349–420.
- . 1961. Pagurid crabs (Decapoda: Anomura) from St. John, Virgin Islands, with descriptions of three new species.—Crustaceana 3:151–166.
- Schmitt, W. L. 1933. Four new species of decapod crustaceans from Porto Rico.—American Museum Novitates 662:1–9.
- Williams, A. B. 1984. Shrimps, lobsters, and crabs of the Atlantic coast of the eastern United States, Maine to Florida.—Smithsonian Institution Press, Washington D.C., 550 pp.